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STREAM POLLUTION IN ILLINOIS[1]

By Langdon Pearse[2]

The subject of stream pollution in Illinois may not be of direct interest to most water works men, for the reason that comparatively few cities in the State take their water from streams, and those that do, as a general rule, take the supply near the headwaters of the streams, above gross pollution. However, most water works men have an indirect interest in that they live on streams that are polluted, and are interested in knowing the conditions and what can be done to cure them.

While the author's experience in Illinois has been largely on the Illinois River problem, he has also had occasion to observe conditions on tributaries at various points. With present populations, the low flow of many of the tributaries, such as the Des Plaines, Fox, Sangamon, and other rivers, is entirely inadequate to dilute the sewage discharged into them before they enter the Illinois. In the various tributaries which are polluted, local nuisances have developed which have been investigated from time to time by the State and local authorities. As yet, little has been done to cure the conditions. Considerable complaint has arisen along the Fox River and along the Des Plaines River above Summit. The Sangamon has been thoroughly investigated from Decatur down. Of the three mentioned, the condition of the Sangamon is undoubtedly the worst. Steps are now being taken to clean up the Des Plaines above Riverside, and work is underway at Decatur to clean the upper reaches of the Sangamon.

Of the various tributaries entering the Illinois River, the Kankakee is in the best condition, and has a moderate dry flow.

The Illinois River, leaving out of account the water taken from Lake Michigan, has a comparatively low flow in dry weather. Prior to 1900, when the Drainage Canal was opened, the records show at

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[1] Read before the Illinois Section, March 26, 1920. Discussions are requested and should be sent to the Editor.

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Peoria that the flow was below 1843 cubic feet per second for 148 to 160 days in a year, with a minimum flow of 723 cubic feet per second. The population along the Illinois River in 1910 was 116,553 from the towns with sewers, and in 1920 is estimated at 133,704. With the additional load from industries, and in particular the corn products industries in the vicinity of Peoria and Pekin, it is probable at the present time the equivalent load in the vicinity of that territory is around 1,000,000 people. Consequently, the low flows of the Illinois River are utterly inadequate for any dilution, and were not the Sanitary District channel in operation, a condition of nuisance would obtain which would be worse than anything before or after the opening of the channel.

The low flow of the Des Plaines River is practically nil. The low flow of the Kankakee varies from 300 to 400 second feet, and the Fox is around 200. Consequently, in dry weather, over 80 per cent or more of the entire flow of the Illinois River at present comes from the Sanitary District channel.

One of the saving factors in reducing the amount of pollution entering the Illinois River from tributaries is the self-purification which takes place in those tributaries. This is evidenced by the high dissolved oxygen found at the mouth of tributaries like the Fox River. Inspection of the flow shows considerable algae growth, which is in itself an indication of self-purification.

The conditions existing in the Illinois River prior to the opening of the drainage canal were very bad, according to all reports and the statements of observers who were familiar with those conditions. The opening of the canal made a constant flow of water, and for many years vastly improved the conditions. With the war, the increased load upon the channel from the industries in Chicago appears to have made a turning point, so that the condition of the canal and river is not as good as it was several years ago. There is, however, no question, if the canal were shut off, that conditions would obtain down the Illinois River which would be worse than anything in the memory of man.

There is considerable tributary population other than Chicago, from Joliet down to Pekin, discharging not only human waste but the waste from industrial establishments, such as tanneries, gas works, corn products factories, smelters, mines, and the like, which is probably equivalent to more than 1,000,000 people. The required flow, even at 3.3 cubic feet per second per thousand people, would mean at least 3000 cubic feet per second of dilution, a flow which is not produced by the Illinois River in a state of nature for at least 166 days per year. This shows that cities along the valley should be greatly interested in maintaining an adequate flow in order to postpone the day of treatment at their expense.

From the strictly sanitary standpoint, it is a question whether the various dams in the river, and in particular in the upper river, are of value. While they retain solids, they are likely in warm weather to become centers of local nuisances, and in particular at Lockport and Marseilles produce anaerobic conditions which use up all the dissolved oxygen available. Such conditions produce nuisance. Sanitarians, therefore, have felt that in streams which receive sewage pollution, where possible, it is best to be free from dams or other obstacles which will retard the flow and make points of sludge deposit. However, under the present conditions, it is probable that the presence of the dams has retarded the movement of sludge down the river. This may have been of value during dry weather.

The problem for the authorities in such a situation is to balance the economic and aesthetic advantages. There is no question but most streams of this character will be required to receive drainage and also sewage. There appears to be no question but that such a river will always be unfit as a source of water for drinking purposes. The pollution is above any limit that has ever been suggested for sewage pollution, even where loads on water filtration plants were being considered. It is a question, with its past history, whether such a water should ever be considered for drinking use. In this connection it is entirely within the range of possibility that inside the next 30 or 40 years most of the towns along the Illinois River will be supplied by water from Lake Michigan. This may prove true for towns as far away as Ottawa.

The stream conditions vary between winter and summer. In normal winters, with a light ice sheet of restricted extent, the conditions are better than in summer. In abnormal winters, when the ice sheet persists and is very extensive, conditions have been found worse than in the summer, owing to the absence of reaeration. As a general rule, the summer conditions seem to be the limiting ones, and consequently they have been studied at more length.

A solution of the problem has been sought in various standards which could be established for consideration. It is proper to endeavor to conserve the fish industry, particularly in the lower

Illinois. Statistics show that at one time the Illinois River was the second largest fish-producing stream in the United States. The amount of dissolved oxygen and conditions requisite for fish life have been studied, and it is possible to maintain conditions by proper treatment so that fish can live in the river above Peoria.

It is a question whether bathing will ever be safe in the upper river because of the pollution. Of course, if everyone were inoculated for typhoid, there would be little risk except for the ear or eye-infection, but when one observes the character of water in which boys go swimming, such as the branches of the Chicago River, it is probable that the Illinois River, when cleaned up, will be attractive to the boy swimmer.

There is no question but what the river can be made fit for boating, and that odors can be prevented. Local nuisances can be reduced and removed. The river should further be unobjectionable for cattle.

At the present time the Sanitary District is making efforts to settle the entire sanitary problem, both from the standpoint of adjusting the diversion from Lake Michigan to the satisfaction of the Federal Government and the Canadian Government, but also of adjusting the lake levels by controlling works, and by progressive sewage treatment to clean up the Illinois River and the local conditions near Chicago. In this program it is proposed to make effective progress in the treatment of industrial wastes, such as those of Packingtown, by the activated sludge process, and by handling generally the industrial waste. Experiments are now under way on tannery waste, and shortly will be inaugurated on corn products wastes. Plans are being drawn for a treatment plant for the sewage originating south of 87th Street in the Sanitary District. Plans are also being studied for the treatment progressively of the entire Sanitary District, and in particular the sewage entering the North Branch of the Chicago River. Conferences have been held with the city officials of the towns in Lake County, Indiana, with a view to having action taken so that their sewage may likewise be treated before it enters the new Calumet Sag channel.

From this brief statement it will be seen that the Sanitary District is now entering upon the third phase of its history. Having built the main channel and diverted the sewage from the drinking water of Chicago, the Sanitary District is now preparing to clean up the Chicago River and the Illinois River, and adjust all the points of difference with its neighbors, both local and national.